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C04B 38/00**C01B 33/12**(21)Application number : **04-302212**(71)Applicant : **ASAHI CHEM IND CO LTD**(22)Date of filing : **12.11.1992**(72)Inventor : **NOMURA MASARU****(54) METHOD FOR CARBONATING POROUS CALCIUM SILICATE HYDRATE**

(57)Abstract:

PURPOSE: To provide a carbonating method capable of increasing the specific surface area of a porous calcium silicate hydrate.

CONSTITUTION: The specific surface area of the porous calcium silicate hydrate is extremely increased by allowing the porous calcium silicate hydrate to react with carbon dioxide by using a previously carbon dioxide-saturated water of ≥ 4 to ≤ 1000 times of the porous calcium silicate hydrate. As a result, by increasing the specific surface area of the porous calcium silicate hydrate, the method for carbonating the porous calcium silicate hydrate, for instance, increasing moisture absorption rate is provided. And the applications are restricted since alkali content is low.

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DETAILED DESCRIPTION

[Detailed description]

[0001]

[Field of the Invention] Especially this invention relates to the carbonation art which increases the specific surface area remarkably about the carbonation art of a porous material calcium-silicate hydrate.

[0002]

[Prior art] The lightweight gas concrete (it is called ALC for short below) which makes a porous material calcium-silicate hydrate a principal component is used abundantly as building materials or a heat insulator. In ALC plant, some defective (what is a grade containing the detailed crack etc.) may occur. Moreover, in the building, the job site of a residence, or the construction site of a heat insulator, the edge material (scrap) of ALC has occurred mostly and the disposal of the edge material of the defective of these ALC or ALC is carried out mostly.

[0003] However, of course, the edge material of ALC does not change at all with the product with the defective of ALC normal in composition. Therefore, it is just going to be asked for carrying out a deployment, without carrying out the disposal of the edge material. Since the porous material calcium-silicate hydrate which is the component of ALC is a porous body, it has much pore and has the specific surface area before and behind 30m² / g. Moreover, in the porous material calcium silicate which performed the carbonation under a natural condition, and the compulsive carbonation by carbon dioxide gas, becoming 60m² / g grade is known. this invention person examined using as a desiccant, the directions, for example, the porous material calcium-silicate hydrate, of the porous material calcium silicate which employs this characteristic feature efficiently, from the aforementioned fact.

[0004]

[Object of the Invention] However, although the aforementioned porous material calcium-silicate hydrate had a specific surface area remarkable as mentioned above, it was small compared with the conventional desiccant, and was not a thing suitable for practical use. [of the moisture absorption] Therefore, this invention aims at offering the carbonation art for obtaining the porous material calcium-silicate hydrate which can be used also for a desiccant by using a porous material calcium-silicate hydrate.

[0005]

[The means for solving a technical problem] It is the carbonation art of the porous material calcium-silicate hydrate characterized by the 1st of this invention carrying out the carbonation of the porous material calcium-silicate hydrate under presence of the water which carbon dioxide gas melted. the 2nd The weight of the water which carbon dioxide gas melted is the technique to which a porous material calcium-silicate hydrate is made to react by 1000 or less times of a porous material calcium-silicate hydrate 4 or more times. the 3rd One sort chosen out of *****, a tobermorite, a gyroscope light, a foshagite, and a hillebrandite Or it is the carbonation art of the porous material calcium-silicate hydrate characterized by carrying out the carbonation of the porous material calcium-silicate hydrate which are two or more sorts of mixture under presence of the water which carbon dioxide gas melted.

[0006] After hardening the slurry-like object which also mixed cellular generation agents, such as a foaming agent and a frothing agent, for what mixed the nature raw material of silicic acid, and

the calcareous raw material, for example, and was made into the shape of a slurry as a porous material calcium-silicate hydrate used for this invention to elevated-temperature hyperbaric-pressure steam regimen or this slurry as they were within a frame mold, the artificial mineral of inorganic porous material, such as ALC which comes to carry out elevated-temperature hyperbaric-pressure steam regimen, etc. can be mentioned. The edge material generated under construction to a defective, a building, a residence, etc. which are generated by manufacturing processes, such as the aforementioned ALC, can be used for this porous material calcium-silicate hydrate.

[0007] What is a xonotlite, a tobermorite, a gyroscope light, a foshagite, a hillebrandite, etc., and uses any one of these components as an independent component as a concrete component of a porous material calcium-silicate hydrate may use two or more kinds as a mixed component. Moreover, CSH gel, the unreacted nature raw material of silicic acid, etc. may be contained.

[0008] Although especially the particle size of a porous material calcium-silicate hydrate is not limited, its 0.6mm or less is desirable from reactivity or the availability of a product. In order to obtain the water which carbon dioxide gas melted, the technique of blowing carbon dioxide gas into water etc. is mentioned that what is necessary is just to melt carbon dioxide gas in water, such as distilled water, by well-known technique. If carbon dioxide gas is melted so that pH of a carbon-dioxide-gas solution may become four to about five although especially the concentration of carbon dioxide gas is not limited, the carbonation of a porous material calcium-silicate hydrate can be performed efficiently.

[0009] In order to carry out the carbonation of the porous material calcium-silicate hydrate of this invention under presence of the water which carbon dioxide gas melted, the method of making a porous material calcium-silicate hydrate immersed in the aforementioned carbon-dioxide-gas lysis underwater etc. is mentioned that what is necessary is just to contact the water which carbon dioxide gas melted, and a porous material calcium-silicate hydrate. if it carries out blowing carbon dioxide gas into carbon-dioxide-gas lysis underwater etc., and lysis underwater carbon-dioxide-gas concentration is boiled to some extent and is always maintained into the carbonation reaction, a carbonation can be performed more efficiently

[0010] If it is 1000 or less times, since specific surface area will become 3 or more times 4 or more times as compared with the porous material calcium-silicate hydrate immediately after a manufacture, the weight ratio to the porous material calcium-silicate hydrate of the water which carbon dioxide gas melted is 50 or more-time 100 or less times desirable still preferably.

[0011]

[Operation] Although silica gel and a calcium carbonate generate in a porous material calcium-silicate hydrate by carrying out carbonation processing of the porous material calcium-silicate hydrate, if this reaction is performed in a lot of aqueous solution like this invention, the amount of calcium will melt into the aqueous solution, the amount of the silica gel per gram of a product will increase, and specific surface area will increase further.

[0012]

[Example] An example and the example of a comparison are used for below, and this invention is explained to it still in detail. The specific surface area shown in an example and the example of a comparison and the moisture absorption were measured by the following technique.

** It measured using the beta soap surface-area meter by specific-surface-area measurement Nikkiso.

[0013] ** Moisture-absorption measurement JIS It measured according to the measuring method of Z0701.

[0014]

[The example of reference] After collecting ALC edge material generated on the building job site, crushing by the crusher and drawing out inner reinforcement, coarse grinding was carried out with the hammer mill. Thus, the obtained coarse-grinding object was screened and the mean particle diameter obtained powder-like ALC 0.6mm or less. The specific surface area and the moisture absorption of this ALC powder (about 30% of water contents) are shown in Table 1. This ALC powder was used in the following examples and examples of a comparison.

[0015]

[Example 1] It stirs at the stirring speed of 300rpm with a stirring machine, adding the weight proportion of ALC powder obtained in the example of reference in the solution which carbon dioxide gas is blown, was saturated in distilled water, and adjusted pH to about 4.4 the back by 4:1, and slushing carbon dioxide gas by 500 cc/min into this solution. It is made to react in this status for 8 hours. Carbonation ALC powder was obtained by carrying out ALC powder a ** exception and drying from the account solution of back to front. About the obtained carbonation ALC powder, specific surface area and the moisture absorption were measured. This result is shown in Table 1.

[0016]

[Example 2] In the example 1, carbonation ALC powder was obtained by the same technique except having added the weight proportion of distilled water which carbon dioxide gas melted, and ALC powder by 50:1. About the obtained carbonation ALC powder, specific surface area and the moisture absorption were measured. This result is shown in Table 1.

[0017]

[Example 3] In the example 1, carbonation ALC powder was obtained by the same technique except having added the weight proportion of distilled water which carbon dioxide gas melted, and ALC powder by 100:1. About the obtained carbonation ALC powder, specific surface area and the moisture absorption were measured. This result is shown in Table 1.

[0018]

[Example 4] In the example 1, carbonation ALC powder was obtained by the same technique except having added the weight proportion of distilled water which carbon dioxide gas melted, and ALC powder by 1000:1. About the obtained carbonation ALC powder, specific surface area and the moisture absorption were measured. This result is shown in Table 1.

[0019]

[The example 1 of a comparison] ALC powder weight proportion of the example of reference was taken out after 36 hour neglect in the carbon-dioxide-gas ambient atmosphere, and carbonation ALC powder was obtained by making it dry. About the obtained carbonation ALC powder, specific surface area and the moisture absorption were measured. This result is shown in Table 1.

[0020]

[Table 1]

		実施例 1	実施例 2	実施例 3	実施例 4
反応条件 (溶液 / 粉体)		4	5 0	1 0 0	1 0 0 0
比表面積 (m ² / g)		1 0 0	1 1 3	1 3 2	1 3 9
吸 湿 率 (%)	2 0 R H %	6	7	9	1 0
	5 0 R H %	7	8	1 1	1 2
	9 0 R H %	1 0	1 2	1 3	1 4
		参考例	比較例 1		
反応条件		未処理	炭酸ガス 雰囲気		
比表面積 (m ² / g)		2 7	5 5		
吸 湿	2 0 R H %	4	5		

率 (%)	5 0 R H %	5	6
	9 0 R H %	6	8

[0021]

[Effect of the invention] By making it the configuration of this invention, the specific surface area of a porous material calcium-silicate hydrate can be raised by simple technique, and the porous material calcium-silicate hydrate which increased the moisture absorption can be offered. Moreover, the intended use of a product becomes large according to an alkalinity being low as compared with the conventional porous material calcium silicate. Furthermore, the deployment of the ALC edge material discarded until now can be carried out by cheap technique.

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CLAIMS

[Claim]

[Claim 1] The carbonation art of the porous material calcium-silicate hydrate characterized by carrying out the carbonation of the porous material calcium-silicate hydrate under presence of the water which carbon dioxide gas melted [a claim 2] The carbonation art of a porous material calcium-silicate hydrate given in the claim 1 whose weight of the water which carbon dioxide gas melted is 4 or more-time 1000 or less times of a porous material calcium-silicate hydrate [a claim 3] The carbonation art of a porous material calcium-silicate hydrate given in the claim 1 which are one sort as which a porous material calcium-silicate hydrate is chosen out of *****, a tobermorite, a gyroscope light, a foshagite, and a hillebrandite, or two sorts or more of mixture

[Translation done.]
